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don ratelii, and the turtle *Ptygogaster emydoides*, have been made for the museum of the Academy of Sciences of Paris. The remains from which the restorations have been made were put aside eighteen years ago by M. A. Milne Edwards, when he wrote his great work on fossil birds, and were taken, like most of M. Edwards' material, from the lower miocene of Saint-Gerand-le-Puy (Allier). Notwithstanding the smallness and great number of the pieces, M. Fischer has succeeded in joining together the head, all the vertebræ, some ribs, most of the members, and a great part of the bony plates of *Diplocynodon*, which M. Vaillant believes to be nearly related to *Jacare*.—In the Bulletin de la Société Géologique de France, Dr. Lemoine describes two casts of the brain mould of the crocodile *Thoracosaurus macrorhynchus*. These remarkable specimens are much like corresponding casts of the modern gavial, but present relatively rather smaller cerebral hemispheres.

Recent.—Herr D. Brauns (Zeit. des Deutsch. Geol. Ges., 1883) describes the diluvial mammals of Japan, and arrives at the conclusion that the geology, flora, pliocene molluscan fauna, and fossil land-fauna of Japan, prove that that country is most intimately connected with the Palæarctic region, and that it is only very recently that it has become a disrupted portion of the Eastern continent.

BOTANY.¹

AN ENORMOUS PUFF-BALL.—My friend, Professor R. E. Call, has handed me a photograph of a puff-ball, the largest on record. The fungus was found by him in Herkimer county, N. Y., in 1877, and as it was impossible to preserve it, careful measurements were made, and photographs of it were taken. It was irregularly oval in outline, and much flattened, instead of approaching the spherical form, as is common in the large puff-balls. Its largest diameter was *five feet and four inches*, its smallest *four feet and six inches*, while its height was but nine and a-half inches. In referring to it Professor Call described it as "much larger than the largest wash-tub we had at home."

The specimen undoubtedly belonged to the species known as the giant puff-ball (*Lycoperdon giganteum*), and it was by far the largest of any of which I have been able to find measurements.—*C. E. Bessey*.

NOTES ON FUNGI.—Among the more interesting fungi are some of the various forms embraced in the genus *Polyporus*, of which over 1000 species have been described. The species of this genus are not as numerous as those of the genus *Agaricus*, of which the common mushroom is a well-known type, but they are not less interesting in the great variety of the forms they assume and in the universality of their diffusion. The *Polyperi* most commonly noticed are probably those growing on dead trees or logs,

¹ Edited by PROF. C. E. BESSEY, Ames, Iowa.

and standing out from the trunk or log like the front piece of a cap, and varying in size from one inch to two feet across, and varying in texture from a soft, juicy, fleshy substance, which decays almost as soon as it has finished its growth, to the hard, woody or corky species that endure for several years, and before the introduction of lucifer matches, furnished the tinder to catch the spark from the flint and steel. If one of these Polypori that grow on trunks of trees is carefully examined, it will be seen that the under side is full of small holes, which are really the mouths of closely-packed tubes extending up for some distance and forming no inconsiderable part of the entire mass. These tubes or pores are always present in every Polyporus, and form the distinctive character of the genus, as is indicated by the word itself—polyporus signifying *many pores*. These tubes or pores vary considerably in size, but are always small, often finer than a cambric needle and not generally larger than a common pin. Their arrangement and appearance is like that of the cells in a honeycomb, and like these they are often more or less angular though normally cylindrical. This system of pores constitutes the *hymenium* in which the seeds, or *spores* as they are called, are produced. When examined with the microscope the inner surface of these tubes is found to be studded with little cylindrical projections, from the rounded apices of which arise generally four short, straight, transparent horns, each bearing at its tip a single minute, globose or oval spore. These spores soon fall from the points of their attachment, out of the tubes in which they grew, in such quantities as to give their own color to any object on which they chance to fall—generally white or rust color—always the same in the same species; the color of the spores, however, in Polypori does not appear to present as great a variety of shades as among the Agarics, but this may be because in the Polypori the color of the spores is not as readily seen, as from some cause they do not appear to be as readily and as copiously discharged as in the Agarics. Another peculiarity of the genus Polyporus is, that the direction of the pores is always *down*, so that in *resupinate* forms on a vertical surface, *i. e.*, on the side of a tree or log, the *sides* of the pores are exposed instead of their mouths. This downward tendency is finely illustrated in a specimen of *Polyporus ignitarius*, which I lately found on the trunk of a dead oak that had fallen and lodged on another tree at an angle of about 45° . The Polyporus had commenced its growth while the trunk was standing, and had continued to grow after the trunk had fallen, as was apparent from a bend or angle of about 45° about midway in the length of the pores, so as to continue their growth directly downwards.—J. B. Ellis, Newfield, N. J.

CROSS-FERTILIZATION IN LOBELIA, &c.—E. Haviland, in Proc. Linn. Soc. N. S. Wales, VIII, pp. 182–86, describes the development of the stamens and pistil in species of Lobelia. The anthers

are closely united in a cylinder. The pollen is shed inside and pushed out by the hairs on the growing style. After the pollen has withered, the apex of the style splits and expands its lobes. The writer considers that cross-fertilization is the almost invariable rule. He also notes (p. 289) the contrivances for cross-fertilization in *Leptospermum*, a genus of Australian shrubs.—*J. F. J.*

WATER FROM EUCALYPTUS ROOTS.—In many parts of Australia, where water is scarce, the natives formerly procured it from the roots of the Eucalyptus and a few other trees. The tree most preferred throws out numerous lateral roots, which lie at a depth of from six to twelve inches below the surface. According to a writer in the Proc. Linn. Soc. of N. South Wales (Vol. VIII, 1883), the native having ascertained, by means of prodding with a pointed stick or spear, the position of some of the roots, "removes the superincumbent soil with his wooden shovel for twenty or thirty feet, and cutting the root off at each end lifts it out of the trench and cuts it up into lengths of about eighteen inches or two feet, knocks off the bark and stands the several portions on end in some receptacle to contain the water. * * * As soon as these pieces are placed on end, the water commences to drip, and when the whole of the root or roots are cut up and placed on end, the native, beginning at the first placed, puts the end in his mouth and by a vigorous puff expels the remaining water. * * The water is beautifully clear, cool and free from any unpleasant taste or smell."—*J. F. J.*

STURTEVANT'S STUDIES OF MAIZE.—In a privately distributed pamphlet, just received, Dr. Sturtevant, the director of the N. Y. Agricultural Experiment Station, sets forth the results of some of his studies of the varieties of maize. A large number of excellent cuts enable the reader to obtain clear ideas respecting the structure of the mature kernels. An attempt is made to classify the varieties, and there appears to be some ground for hoping that it will not be unsuccessful. From a careful study of many kinds of maize, grown upon the grounds of the experimental station, Dr. Sturtevant is led to the conclusion that at least five well-marked species may be recognized. At present he denominates these agricultural species, and distinguishes them from the species of systematic botany by a star (*) placed between the generic and specific names.

These species are as follows :

1. *Zea * everta*, the pop corns.
2. *Zea * indurata*, the flint corns.
3. *Zea * indentata*, the dent corns.
4. *Zea * amylacea*, the soft corns.
5. *Zea * saccharata*, the sweet corns.

In the foregoing, if the kernels be split parallel to the embryo the pop corns show only a corneous endosperm ; in the flint corns a corneous belt surrounds an interior softer tissue ; in the dent

corns the softer tissue extends to the apex of the kernel, and is bounded by a column of corneous tissue on each side; the soft corns have no corneous tissue; while the sweet corns are composed of a translucent and more or less shriveled corneous matter.

Each of these species is divisible into several sub-species or races, which exhibit remarkable permanence. In fact, one of the unlooked-for facts brought out by these observations of Dr. Sturtevant, is the permanence of the several types, whether of species or races, as indicated below.

The following general conclusions are recorded:

"Cross-fertilization of the current year is manifested on the kernel and not on the ear, and this influence is not reciprocally strong as between the races [species] or even the sub-races, and the resistance to current hybridization is more strongly marked in some races [species], sub-races or varieties than in others.

"Hybridization in the seed used produces a variety of ears, but each ear in general is quite close to one of the parent types; an intermixture of kernel in no case seems to be produced. Reciprocal fertilization between two races [species] does not seem to be productive of equal effect."

CURTISS' SEVENTH FASCICLE OF NORTH AMERICAN PLANTS.—This welcome package, with its fine specimens, was distributed to botanists in February. Like its predecessors it contains many species of great interest, especially to Northern collectors. Most of the *NATURALIST* readers are aware that Mr. Curtiss has been collecting for many years in Florida, and that his specimens have found their way into most of the great herbaria of this country and Europe.

ANOTHER BOTANY.—Some time ago our attention was called to another text-book of Botany, prepared by Dr. Kellerman, and brought out by the house of Potter & Co. of Philadelphia. We hoped for the sake of the younger botanical writers to be able to commend this effort of a new author, but candor and a consideration for the readers of the *NATURALIST* compel us to say that the work has been poorly done. Naturally the book is a compilation, but this has been, as it appears to us, unwisely and injudiciously done. Parts I, II and III contain numerous cuts, definitions and expressions which have evidently been boldly copied from well-known text-books without the remotest acknowledgment. However, had this questionable method of compilation given us a reliable text-book, the pupils in the schools would have had no reason for complaining; but, as is inevitable in such book making, the several parts so brought together do not fit well; hence, we find statements in one part contradicted in another. The announcement is made on page 4 that the author has in preparation a manual of the wild flowers of the northern United

States, a field now occupied by Dr. Gray's and Professor Wood's manuals. It is to be hoped that Dr. Kellerman's second book will be a less verbatim compilation than his first has been.

BOTANICAL NOTES.—We have examined Professor Groff's *Plant Analysis*, published by the Science and Health Publishing Company of Lewisburg, Pa., and can commend it to those who wish a cheap and yet good help of this kind.—Dr. Farlow, in the *March Botanical Gazette*, makes a number of interesting additions to his previous list of *Peronosporæ*.—In a recent number of *Nature*, Dr. Schweinfurth contributes an interesting paper on the flora of ancient Egypt. As is well known, the funeral wreaths preserved in the mummy cases have been objects of study by botanists for some time, and through these we now know much as to the common plants of the Nile region thirty to thirty-five centuries ago. The evidence as obtained shows that some important migrations have taken place during the time which has elapsed since the wreaths were gathered. On the other hand, there is evidence that some plants have, through this long period, preserved not only their places in the flora, but their specific and varietal characters as well.—The last part (No. 7, *Algæ*) of the new edition of Rabenhorst's *Kryptogamen Flora* brings Dr. Hauck's work up to the *Phæozoösporæ*.—It gives us great pleasure to learn that the New York Agricultural Experiment Station has secured the services of Professor J. C. Arthur, who is to be the station botanist. The director of the station is to be congratulated upon his wise selection, which is an indication that *plant life*, rather than *plant names*, shall receive the greatest attention of the station.—Thomas Hick, in the *March Journal of Botany*, concludes his paper on protoplasmic continuity in the *Florideæ*. He says in conclusion, after having examined many species of widely different genera, "It seems clear that, if not universal, protoplasmic continuity is very widely distributed in the *Florideæ*," and further on, in explanation of this phenomenon, "The process of cell-division appears never to proceed so far as to completely separate the different portions of a divided protoplasmic body, so that they remain connected together by one or more threads of protoplasmic material."

ENTOMOLOGY.

GILLS OF INSECT LARVÆ.—In an article on this subject in *Psyche* (IV, 110, 1883), Professor G. Macloskie states that it is usual to describe the laminæ of the pneumatic gills as containing systems of fine tracheal loops, somewhat after the pattern of a plurality of carbon-wicks in an Edison lamp. In a specimen, however, of the rectal branchiæ of the larval *Libellula*, which he rolled under the cover-glass, he found that the multitude of tracheal ramifications ended cœcally; all were of about the same